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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/891,611	06/27/2001	Mamoru Nakasuji	010817	8874

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EXAMINER	
BERMAN, JACK I	

ART UNIT	PAPER NUMBER
2881	

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Please find below and/or attached an Office communication concerning this application or proceeding.

H.A

Office Action Summary	Application No.	Applicant(s)	
	09/891,611	NAKASUJI ET AL.	
	Examiner	**Art Unit**	
	Jack I. Berman	2881	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on 26 January 2005.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 105-108 and 110-149 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) 126,137-140 and 148 is/are allowed.

6)☒ Claim(s) 105-108,110-125,127-136,141-147 and 149 is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on 22 October 2001 is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 115 and 136 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. The addition of the word "simultaneously" in the amendment filed on January 26, 2005 does nothing to address the problem expressed in the previous Office action. It is the meaning of the entire limitation "the primary optical system has a function of scanning the charged particle beams at a distance greater than the interval of irradiation of the neighboring charged particle beams" that is unclear. What is meant by "the primary optical system has a function of scanning the charged particles at a distance greater than the interval of the neighboring charged particle beams"? Is applicant trying to claim that the primary optical system scans the charged particle beams *over* a distance greater than the interval of the neighboring charged particle beams, that the primary optical system is located at a distance from the sample that is greater than the interval of the neighboring charged particle beams, or is some other meaning intended? The language of this limitation is so garbled that it is not clear what subject matter applicant was intending to claim. Therefore, the invention claimed could not be compared to the prior art. The lack of a rejection based upon prior art should not be construed as a determination that the claims contain allowable subject matter, only that the claim is incomprehensible. With regards to claim 136, while applicant has successfully explained how the specification enables the making and operation of the apparatus claimed therein, thereby overcoming the rejection under the first paragraph of 35 U.S.C. 112, applicant has not corrected the other problem pointed out in the previous Office action: claim 136 conflicts with its parent

claim 124 because claim 136 requires two E x B separators ("one of the E x B separators" and "the other E x B separator") and claim 124 requires a single E x B separator ("an E x B separator which [is] common to the primary charged particle beam irradiation systems and the secondary charged particle optical systems"). This conflict makes claim 136 indefinite.

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.
>
> (e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

The changes made to 35 U.S.C. 102(e) by the American Inventors Protection Act of 1999 (AIPA) and the Intellectual Property and High Technology Technical Amendments Act of 2002 do not apply when the reference is a U.S. patent resulting directly or indirectly from an international application filed before November 29, 2000. Therefore, the prior art date of the reference is determined under 35 U.S.C. 102(e) prior to the amendment by the AIPA (pre-AIPA 35 U.S.C. 102(e)).

Claims 114, 135, and 141 are rejected under 35 U.S.C. 102(b) as being anticipated by U.S. Patent No. 5,892,224 to Nakasuji for the reasons explained in the previous Office actions. The minor amendments to these claims have not affected their anticipation by Nakasuji because Nakasuji does comprise "one primary optical system" and "one secondary optical system" as is now claimed in claim 114 and the plurality of beams used in the Nakasuji system to inspect the

sample are inherently disposed around one optical axis as is now claimed in claim 141. The deletion of the words "with an optical axis", "in a direction of transferring the sample" and "in a direction perpendicular to the direction of transferring the sample" in claim 135 does not add any limitations to distinguish the claimed invention from the Nakasuji method,

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 105, 113, 116-119, 124, 125, 127-132, 134, and 143-147 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nakasuji in view of U.S. Patent No. 4,954,705 to Brunner et al. As was explained in the previous Office action, Nakasuji discloses an inspection apparatus for inspecting an object of inspection by irradiating the object of inspection with charged particles comprising:

a working chamber controllable into a vacuum atmosphere for inspecting an object of inspection (not labeled but inherently required because electron beam optical systems only work in a vacuum);

a beam source (1) for generating the charged particles or the electromagnetic wave as a plurality of beams (EB11, EB21, EB31, ..., EB36);

a primary electronic optical system for irradiating the plurality of beams to the object of inspection held in the working chamber, and a secondary electronic optical system, including at least one lens (9), for converging secondary charged particles generated from the object and

leading to an image processing system (signal processor 12) which forms an image based on the secondary charged particles;

a data processing system (memory 14) for displaying and/or memorizing a state information of the object based on output of the image processing system; and

a stage system (28) for holding the object so as to be movable relative to the beam,

wherein an electric field for accelerating the charged particle beams is applied between a first stage lens of the secondary optical system and a surface of the object (lines 13-19 in column 9), and the secondary charged particles emitted from the surface of the object at an angle relative to a normal line of the surface of the object pass through the secondary optical system. While Nakasuji does not specifically teach to use secondary charged particles emitted at an angle of 45 degrees relative to the normal, the patent does teach at lines 23-41 in column 10 that the angle should be oblique and large enough to allow more space for detectors than is permitted by the space permitted when the primary beam irradiates the sample from a normal. Since angles of at least 45 degrees meet this criterion, such angles would be at least obvious over, if not inherently anticipated by, Nakasuji. While Nakasuji irradiates the sample with the primary beams at an oblique angle so as to provide separation between the primary beams and the secondary electrons emitted so that there is more room for detectors, Brunner et al. discloses an inspection apparatus wherein the electronic optical system comprises an objective lens (L2) and an E x B separator (WF), forms a plurality of beams to irradiate the object (see lines 14-22 and 37-48 in column 3), and includes an optical system for accelerating secondary charged particles emitted by irradiation of the beams through the objective lens (see lines 48-51 in column 2), separating the particles by the E x B separator (see Figure 2), and projecting an image of secondary charged particles (see

lines 51-62 in column 2), and a plurality of detectors for detecting the image of secondary charged particles (see lines 62-66 in column 2). (The Brunner et al device is also described in Section 3 of the article "Multi-Beam Concepts for Nanometer Devices" by Lischke et al., cited in the Information Disclosure Statement filed on January 18, 2002.) It would have been obvious to a person having ordinary skill in the art to use the electron-optical system disclosed by Brunner et al. to control the multiple electron beams used by Nakasuji when the Nakasuji apparatus is used to inspect semiconductors for defects since the Brunner et al. electron-optical system is designed specifically for this purpose. Since both Nakasuji and Brunner et al. teach that the plurality of charged particle beams may be formed by either providing a plurality of electron beam sources or an aperture plate that divides a single electron beam into a plurality of electron beams, the provision of both a plurality of electron sources and aperture plates that divide the electron beams from each of these electron sources into a larger plurality of beams would have been an obvious duplication of parts, as would the provision of a plurality of E x B separators as claimed in Claim 140 of the instant application. While Brunner et al. uses the same lenses for both the primary electrons and the secondary electrons, the patent explicitly teaches at lines 56-64 in column 3:

> "Further lenses can be provided in the described electron beam measuring instrument in order to achieve the necessary demagnification of the primary electron source or, respectively, magnification of the secondary particle source.
>
> Of course, it is also possible to separate the electron-optical beam paths of primary particles and secondary particles and to provide imaging elements for each beam path."

Nakasuji further teaches, at lines 13-62 in column 11, that when the plurality of electron beams are formed by means of an aperture plate between the electron source and the sample, the

position of the single aperture plate in the direction of the optical axis should be disposed so as to minimize the difference in beam strength of the beams to be delivered from each aperture to the surface of the sample. At lines 41 in column 12 through line 41 in column 13, Nakasuji also teaches to provide a second multi-aperture plate with a plurality of apertures disposed in front of the detector wherein the positions of the apertures formed in the second multi-aperture plate are arranged so as to correct a distortion in the secondary optical system.

Claims 106-108 and 111 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nakasuji in view of Brunner et al. as applied to claims 105, 113, 116-119, 124, 125, 127-132, 134, and 143-147 above, and further in view of U.S. Patent No. 6,344,750 to Lo et al. As was explained in the previous Office actions, Nakasuji does not teach how the object under test is moved in or out of the (inherently required) working chamber, to isolate the object under test from vibrations, to apply a voltage to the object under test, how the object under test is held, or how the positioning of the object under test is determined. Lo et al. discloses scanning electron beam inspection apparatus similar to Nakasuji's and teaches at lines 53-60 in column 7 that transport mechanisms for securing an object under testing for transportation into and out of a testing chamber are conventional. It would have been obvious to a person having ordinary skill in the art to provide the Nakasuji/ Brunner et al. apparatus discussed above with the conventional transport mechanism cited by Lo et al. At lines 48-53 in column 7, Lo et al. teaches to provide a vibration isolator (50) for preventing vibrations of the object under testing. It would have been obvious to a person having ordinary skill in the art to provide such a device in the Nakasuji/ Brunner et al. apparatus discussed above because vibrations would be as detrimental to image resolution in the Nakasuji/Brunner et al. apparatus as they would be in the Lo et al. apparatus. At

lines 4-20 in column 7 Lo et al. teaches to apply a voltage to the object (22) from a bias source (28) and to increase or decrease this voltage from zero to a predetermined value in order to either optimize voltage contrast or control the landing energy of the primary beam to prevent charge leakage through layers on the object under inspection. It would have been obvious to a person having ordinary skill in the art to apply this voltage to the sample in the Nakasuji/ Brunner et al. system discussed above in order to have the same degree of control as in the Lo et al. apparatus. Lo et al. also teaches, at lines 38-44 in column 7 and lines 38-40 in column 8, that an alignment controller to control the position of the sample is needed and may comprise a laser interference type distance measuring unit (laser interferometer) for observing the surface of the object of inspection and providing feedback to determine the coordinates of the stage. It would have been obvious to a person having ordinary skill in the art to provide such an alignment controller including a laser interferometer as the controller in the Nakasuji/ Brunner et al. apparatus discussed above that Lo et al. teaches is required.

Claims 110 and 112 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nakasuji, Brunner et al., and Lo et al. as applied to claims 106-108 and 111 above, and further in view of U.S. Patent No. 4,911,103 to Davis et al. While Lo et al. teaches a person having ordinary skill in the art to provide the Nakasuji apparatus with a conventional transport mechanism, including a loading chamber (loadlock subsystem 52), and to provide a vibration isolator (50) for preventing vibrations of the object under testing, neither Nakasuji, Brunner et al., nor Lo et al. discuss the problem of dust adhering to a wafer as the loading chamber is evacuated. Davis et al. discusses this problem at line 64 in column 10 through line 31 in column 11 and teaches that it occurs whenever wafers are transferred into a vacuum chamber through a

loading chamber and further teaches to solve it by supplying a clean gas to the wafer. It would have been obvious to a person having ordinary skill in the art to apply Davis et al.'s solution to this problem, which would inherently occur in the Nakasuji/Brunner et al./Lo et al. apparatus discussed above, by using Lo et al.'s loadlock subsystem as a mini-environment chamber for supplying a clean gas to said object under testing to prevent dust from attaching to said object under testing. Davis et al. also teaches, at lines 20-27 in column 23, that any number of load lock chambers and processing modules and transfer arms can be provided to deliver wafers between any two chambers in any sequence if desired. The provision of a plurality of loading chambers disposed between the mini-environment chamber discussed above and the testing chamber, each adapted to be independently controllable in a vacuum atmosphere, a first transport unit for transporting an object under testing between one of the loading chambers and the mini-environment chamber, and a second transport unit for transporting said object under testing between one of said loading chambers and said testing chamber would therefore have been an obvious duplication of parts in accordance with Davis et al.'s suggestion. Davis et al. also teaches, at lines 42-61 in column 13, to perform a rough alignment of the object of inspection in the XY-directions and in the direction of rotation within the mini-environment space and it would have been obvious to a person having ordinary skill in the art to also include this function in the Nakasuji/Brunner et al./Lo et al. apparatus discussed above for the same reasons discussed by Davis et al., i.e. quicker throughput.

Claims 114, 120-123, and 142 are rejected under 35 U.S.C. 102(b) as being anticipated by U.S. Patent No. 5,430,292 to Honjo et al. Honjo et al. discloses an inspection apparatus (2) for inspecting an object of inspection by irradiating the object of inspection with charged particles

comprising: a working chamber controllable into a vacuum atmosphere for inspecting an object of inspection (not labeled but inherently required because electron beam optical systems only work in a vacuum); a beam generating means (21, 101, 311) for emitting the charged particles as a beam; a primary electronic optical system (25) wherein a plurality of beams (B) is guided to irradiate the object (S) of inspection held in the working chamber, and a secondary optical system (630, 631 in Fig. 37) leads secondary charged particles generated from the object to at least one detector (632) where they are detected and the detector output signals are led to an image processing system (355) which forms an image based on the secondary charged particles; a data processing system (356) for displaying and/or memorizing a state information of the object based on output of the image processing system; and a stage system (3)for holding the object so as to be movable relative to the beam. Honjo et al. also teaches throughout the patent that the apparatus is useful for detecting defects on wafers during or after a manufacturing process. At lines 52-65 in column 27, Honjo et al. describes how the plurality of the charged particle beams are irradiated at positions separated by distance resolution of the secondary optical system. At lines 53-58 in column 9, Honjo et al. teaches that inspection, including the detection of secondary charged particles, occurs while transferring the sample. At lines 29-32 in the same column, Honjo et al. teaches that the points of irradiation by the primary charged beams to be formed on the surface of the sample may be arranged in two dimensional directions, i.e. in rows and columns. It would have been obvious to a person having ordinary skill in the art to arrange these points within a circle that includes the optical axis of the primary electronic optical system so that the primary charged particle beams can be deflected to these points. At line 63 in column 9 through line 21 in column 10, Honjo et al. teaches that the plurality of charged particle

beams can be formed by directing a primary beam (B) through an aperture plate having a plurality of apertures adapted to form a plurality of charged particle beams, the beams being formed by containing particles generated by the beam generating means to form irradiation points disposed in rows N in a direction of transferring the sample and in columns M in a direction perpendicular to the direction of transferring the sample, and the apertures are located within a range of a predetermined electron density of the charged particles emitted from the beam generating means.

Claims 133 and 149 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nakasuji and Brunner et al. as applied to claims 105, 113, 116-119, 124, 125, 127-132, 134, and 143-147 above, and further in view of U.S. Patent No. 6,509,569 to Frosien. At lines 39-49 in column 1, Frosien teaches that it is known in the art to focus the images of secondary charged particles onto a deflecting main plane of an E x B separator used to separate primary electrons from secondary electrons. At lines 4-10 and 60-63 in column 3, Frosien teaches that when an E x B separator is used to separate a beam of primary electrons from a beam of secondary electrons traveling in the opposite direction, the E x B separator can deflect only one of the beams achromatically (without chromatic aberration), so in order to compensate for chromatic aberrations in the other beam, that beam should be focused so that its crossover, that is to say the image of the source of the beam as seen from the point of view of the separator, is positioned on the separator. It would have been obvious to a person having ordinary skill in the art to design the Nakasuji/Brunner et al. apparatus discussed above in order to eliminate chromatic aberrations. This would require positioning either the secondary electron image of the surface or the image of the plurality of apertures used by Nakasuji to form the plurality of beams at the

position of the E x B separator. While applicant has amended claim 133 to distinguish over the prior art by adding the limitation that the primary optical system has a deflection system which scans the charged particle beams simultaneously, Nakasuji also teaches this limitation at, for example, lines 41-46 in column 8.

Claims 126, 137-140, and 148 are allowed.

Claim 136 would be allowable if rewritten to overcome the rejection(s) under 35 U.S.C. 112, 2nd paragraph, set forth in this Office action and to include all of the limitations of the base claim and any intervening claims.

The following is a statement of reasons for the indication of allowable subject matter: the prior art does not teach to dispose the primary and secondary optical columns in two rows and plural columns with the directions of deflection of the E x B separators set so that the secondary electron detectors in the first row and the secondary electron detectors in the second row are disposed "oppositely each other", i.e. on opposite sides of their respective primary optical columns as illustrated in Figure 43, or to use a scanning voltage superimposed on the electric field of the E x B separator to deflect the beam. Applicant's argument in the amendment filed on January 26, 2005 that such an electric field is not equivalent to Adamec's scanning magnetic field superimposed on the E x B separator because the secondary particles would be deflected in the opposite direction of the primary particles by Adamec's scanning magnetic field is convincing.

Applicant's arguments filed January 26, 2005 have been fully considered but they are not persuasive.

With respect to the rejection of claims 105-113, 118, 119, 124, 125, 129, 131, 132, 134, and 146 under 35 U.S.C. 103(a) as being unpatentable over Nakasuji in view of Brunner et al., applicant argues that neither reference teaches to provide at least one lens between the E x B separator and the detectors or between the E x B separator and a lens at the side of the beam source; however, as was explained in the previous Office action and repeated above, while Brunner et al. uses the same lenses for both the primary electrons and the secondary electrons, the patent explicitly teaches at lines 56-64 in column 3:

> "Further lenses can be provided in the described electron beam measuring instrument in order to achieve the necessary demagnification of the primary electron source or, respectively, magnification of the secondary particle source.
>
> Of course, it is also possible to separate the electron-optical beam paths of primary particles and secondary particles and to provide imaging elements for each beam path."

It would therefore have been obvious to a person having ordinary skill in the art to provide at least one lens between the E x B separator and the detectors when the E x B separator suggested by Brunner et al. was incorporated into the Nakasuji system in order to achieve the magnification of the secondary particle source that is also suggested by Brunner et al. Since Brunner et al. positions the E x B separator at a location where the secondary charged particles have already passed through the objective lens (L2), such an additional lens would be located where the secondary charged particles have already passed through the objective lens and then been separated from the primary charged particles by the E x B separator. The above-cited section of Brunner et al. also suggests providing another lens between the beam source and the E x B separator in order to demagnify the primary charged particle source.

Applicant also argues that Nakasuji and Brunner et al. do not teach to locate the single aperture plate in the primary optical system at a position to minimize the difference in beam strength of the beams to be delivered from each aperture to the surface of the sample, to minimize the difference between the amount of secondary particles detected for the plurality of apertures when no pattern is disposed on the sample, or to correct a distortion of the primary optical system as is claimed in claims 127, 128, 130, and 145; however, as was explained in the previous Office action and repeated above, Nakasuji further teaches, at lines 13-62 in column 11, that when the plurality of electron beams are formed by means of an aperture plate between the electron source and the sample, the position of the single aperture plate in the direction of the optical axis should be disposed so as to minimize the difference in beam strength of the beams to be delivered from each aperture to the surface of the sample. This, by definition, means that the plurality of apertures would be located within a range of a predetermined current density of charged particles and would inherently minimize the difference between the amount of secondary particles detected for the plurality of apertures when no pattern is disposed on the sample because if the primary beams and the sample were both uniform, then the beams of secondary particles would also inherently be uniform. The above-cited section of Nakasuji also teaches, specifically at lines 30-41, to position the apertures to correct distortions of the primary optical system.

Applicant also argues that Nakasuji and Brunner et al. do not teach to combine a multiple integrated cathode source with an aperture plate having a plurality of apertures as is claimed in claims 143 and 144; however, as was explained in the previous Office action and repeated above, since both Nakasuji and Brunner et al. teach that the plurality of charged particle beams may be

formed by either providing a plurality of electron beam sources or an aperture plate that divides a single electron beam into a plurality of electron beams, the provision of both a plurality of electron sources and aperture plates that divide the electron beams from each of these electron sources into a larger plurality of beams would have been an obvious duplication of parts.

With respect to the rejection of claim 147 under 35 U.S.C. 103(a) as being unpatentable over Nakasuji in view of Brunner et al., applicant argues that neither reference recites the feature "wherein the secondary charged particles emitted from the surface of the sample at an angle at least 45 degrees relative to a normal line of the surface of the sample pass through the secondary optical system, and wherein an accelerated field for the secondary electron is formed between the objective lens and the surface of the sample". As was explained in the previous Office action and repeated above, while Nakasuji does not specifically teach to use secondary charged particles emitted at an angle of 45 degrees relative to the normal, the patent does teach at lines 23-41 in column 10 that the angle should be oblique and large enough to allow more space for detectors than is permitted by the space permitted when the primary beam irradiates the sample from a normal. Since angles of at least 45 degrees meet this criterion, such angles would be at least obvious over, if not inherently anticipated by, Nakasuji.

With respect to the rejection of claims 114, 120-123, and 142 under 35 U.S.C. 102(b) as being anticipated by Honjo et al., applicant argues: "In Honjo et al., one primary optical system has an optical axis for irradiating the sample with a single charged particle beam, and one secondary optical system has a single detector. It is only when one primary optical system has an optical axis for irradiating the sample and a plurality of charged particle beams like claim 114 that the distance between charged particle beams becomes a problem, and it differs from Honjo

et al." Applicant also argues that Honjo et al. does not teach the feature: "the primary charged particles are disposed inside a circle of which center is said optical axis" or "the plurality of apertures are located within a range of a predetermined current density of the charged particles emitted from the beam source". However, as was explained in the previous Office action and repeated above, at line 63 in column 9 through line 21 in column 10, Honjo et al. teaches that the plurality of charged particle beams can be formed by directing a primary beam (B) through an aperture plate having a plurality of apertures adapted to form a plurality of charged particle beams, the beams being formed by containing particles generated by the beam generating means to form irradiation points disposed in rows N in a direction of transferring the sample and in columns M in a direction perpendicular to the direction of transferring the sample, and the apertures are located within a range of a predetermined electron density of the charged particles emitted from the beam generating means. Since the current density of the charged particle beam is inherently at a maximum on the optical axis and falls off with increasing distance from this axis, the area wherein the density lies within a predetermined range would inherently be a circle.

With respect to the rejection of claim 149 under 35 U.S.C. 103(a) as being unpatentable over Nakasuji in view of Brunner et al. and Frosien, applicant argues that none of the references recites the feature "wherein the beam from the beam source is irradiated onto the aperture plate to form an image of the plurality of apertures, a position of the image of the plurality of apertures is made to correspond to a position of the E x B separator"; however, as was explained in the previous Office action and repeated above, at lines 4-10 and 60-63 in column 3, Frosien teaches that when an E x B separator is used to separate a beam of primary electrons from a beam of secondary electrons traveling in the opposite direction, the E x B separator can deflect only one

of the beams achromatically (without chromatic aberration), so in order to compensate for chromatic aberrations in the other beam, that beam should be focused so that its crossover, that is to say the image of the source of the beam as seen from the point of view of the separator, is positioned on the separator. It would have been obvious to a person having ordinary skill in the art to design the Nakasuji/Brunner et al. apparatus discussed above in order to eliminate chromatic aberrations. This would require positioning either the secondary electron image of the surface or the image of the plurality of apertures used by Nakasuji to form the plurality of beams at the position of the E x B separator.

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jack I. Berman whose telephone number is (571) 272-2468. The examiner can normally be reached on M-F (8:30-6:00) with every second Friday off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, John R. Lee can be reached on (571) 272-2477. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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